

## REMARKS

By this amendment, Applicants have amended claims 1-3, 7-8, 11, 13-15, 26, and 28; and added a new claim 29. As a result, claims 1-3, 7-8, 10-11, 13-17, 20-21, 23-26, and 28-29 are pending in this application. These amendments are being made to clarify the presently claimed subject matter, and are not being made to overcome the rejections included in the Office Action. Applicant does not acquiesce in the correctness of the objections and rejections and reserves the right to pursue the full scope of the subject matter of the original claims, or claims that are potentially broader in scope, in the current and/or a related patent application. Reconsideration in view of the following remarks is respectfully requested.

In the Office Action, claims 1-3, 7-8, 10-11, 13-17, 20-21, 23-26, and 28 are rejected as allegedly being unpatentable over U.S. Patent No. 5,371,388 (Oda) in view of U.S. Patent No. 5,729,017 (Brenner).

With respect to claim 1, Applicants respectfully submit that the Office fails to establish a *prima facie* case of obviousness. For example, the Office fails, *inter alia*, to show that Oda teaches a semiconductor device that comprises at least one of: a heterodimensional diode, a field effect transistor array, a heterodimensional diode array, or an array of rectifying contacts as in claim 1. In rejecting claim 1, the Office alleges that Figs. 12 and 15 of Oda disclose “a semiconductor device... [that] comprises one of heterodimensional diode or field effect transistor”. Office Action, p. 2. However, Applicants respectfully submit that the device in Oda is not a heterodimensional diode. Further, even if, *arguendo*, the device in Oda is a field effect transistor, the claimed semiconductor device can comprise a “field effect transistor array”. As a result, Applicants respectfully submit that Oda fails to teach or suggest a semiconductor device that comprises at least one of: a heterodimensional diode, a field effect transistor array, a

heterodimensional diode array, or an array of rectifying contacts as in claim 1. Should the Office maintain this interpretation of Oda, Applicants respectfully request that the Office clarify how the device in Oda is allegedly at least one of: a heterodimensional diode or a field effect transistor array.

With further respect to claim 1, Applicants respectfully submit that the Office fails, *inter alia*, to show that Oda teaches adjusting a frequency of the radiation using a voltage applied to the semiconducting device as in claim 1. In support of its rejection, the Office cites the Abstract of Oda as allegedly teaching this feature. Office Action, p. 2. However, Applicants note that Oda's Abstract does not include any discussion of adjusting a frequency of radiation, let alone doing so using a voltage applied to a semiconducting device as in claim 1. In sharp contrast, Oda teaches modulation of the gate voltage to attain modulation of a current amplitude, see, e.g., Oda, col. 7, lines 43-46, and setting a voltage according to an intensity of light to be detected, see, e.g., Oda, col. 10, lines 15-28. Applicants note that the intensity of light and the current amplitude are unrelated to the claimed frequency of the radiation. As a result, Applicants respectfully submit that Oda fails to teach or suggest adjusting a frequency of the radiation using a voltage applied to the semiconducting device as in claim 1. Should the Office maintain this interpretation of Oda, Applicants respectfully request that the Office clarify how Oda allegedly teaches adjusting a frequency of the radiation using a voltage applied to the semiconducting device.

In light of the above, either alone or in combination, Applicants respectfully request withdrawal of the rejections of claim 1 and claims 2-3, 7, and 23-24, which depend therefrom, as allegedly being unpatentable over Oda in view of Brener.

With respect to claim 8, Applicants respectfully submit that the Office fails to establish a *prima facie* case of obviousness. For example, the Office fails, *inter alia*, to show that Oda or Brener teaches or suggests adjusting a frequency of the radiation by adjusting a carrier density of carriers in a channel of the field effect transistor, wherein the adjusting includes adjusting a gate length for the gate as in claim 8. Applicants note that neither Oda nor Brener includes any discussion related to the adjusting in claim 8. Further, the Office does not address this feature in the Office Action. As a result, Applicants respectfully request withdrawal of the rejection of claim 8 as allegedly being unpatentable over Oda in view of Brener. However, should the Office maintain this rejection, Applicants respectfully request that the Office particularly point out how Oda or Brener allegedly teaches or suggests adjusting a frequency of the radiation by adjusting a carrier density of carriers in a channel of the field effect transistor, wherein the adjusting includes adjusting a gate length for the gate as in claim 8.

With respect to claim 10, Applicants respectfully submit that the Office fails to establish a *prima facie* case of obviousness. For example, the Office fails, *inter alia*, to show that Oda or Brener teaches or suggests adjusting a frequency of the radiation by adjusting a carrier density of carriers in a channel of the field effect transistor, wherein the field effect transistor comprises a transparent gate, and wherein the laser pulse is shone onto the transparent gate as in claim 10. Applicants note that neither Oda nor Brener includes any discussion related to the adjusting in claim 10. Further, the Office does not address this feature in the Office Action. As a result, Applicants respectfully request withdrawal of the rejection of claim 10 as allegedly being unpatentable over Oda in view of Brener. However, should the Office maintain this rejection, Applicants respectfully request that the Office particularly point out how Oda or Brener allegedly teaches or suggests adjusting a frequency of the radiation by adjusting a carrier density

of carriers in a channel of the field effect transistor, wherein the field effect transistor comprises a transparent gate, and wherein the laser pulse is shone onto the transparent gate as in claim 10.

With respect to claim 11, Applicants respectfully submit that the Office fails to establish a *prima facie* case of obviousness. For example, the Office fails, *inter alia*, to show that Oda or Brener teaches or suggests adjusting a frequency of the radiation by adjusting a carrier density of carriers in a channel of the field effect transistor, wherein the adjusting uses a bias voltage applied to a periodic grating gate of the field effect transistor as in claim 11. Applicants note that neither Oda nor Brener includes any discussion related to the adjusting in claim 11. Further, the Office does not address this feature in the Office Action. As a result, Applicants respectfully request withdrawal of the rejection of claim 11 as allegedly being unpatentable over Oda in view of Brener. However, should the Office maintain this rejection, Applicants respectfully request that the Office particularly point out how Oda or Brener allegedly teaches or suggests adjusting a frequency of the radiation by adjusting a carrier density of carriers in a channel of the field effect transistor, wherein the adjusting uses a bias voltage applied to a periodic grating gate of the field effect transistor as in claim 11.

With respect to claims 13 and 14, Applicants respectfully submit that the Office fails to establish a *prima facie* case of obviousness. For example, the Office fails, *inter alia*, to show that Oda or Brener teaches or suggests adjusting a frequency of radiation by adjusting a carrier density of carriers in a channel of a field effect transistor as in claims 13 and 14. Applicants note that neither Oda nor Brener includes any discussion related to the adjusting in claims 13 and 14. Further, the Office does not address this feature in the Office Action. As a result, Applicants respectfully request withdrawal of the rejection of claims 13 and 14 as allegedly being unpatentable over Oda in view of Brener. However, should the Office maintain this rejection,

Applicants respectfully request that the Office particularly point out how Oda or Brener allegedly teaches or suggests adjusting a frequency of radiation by adjusting a carrier density of carriers in a channel of a field effect transistor as in claims 13 and 14.

With respect to claim 15, Applicants respectfully submit that the Office fails to establish a *prima facie* case of obviousness. For example, the Office fails, *inter alia*, to show that Oda or Brener teaches or suggests adjusting a frequency of radiation using a voltage applied to a heterodimensional diode to adjust a frequency of a plasma wave in a two-dimensional carrier gas in the heterodimensional diode as in claim 15. Applicants note that neither Oda nor Brener includes any discussion related to the adjusting in claim 15. Further, the Office does not address this feature in the Office Action. As a result, Applicants respectfully request withdrawal of the rejections of claim 15 and claims 16-17, 20, 25-26, which depend therefrom, as allegedly being unpatentable over Oda in view of Brener. However, should the Office maintain this rejection, Applicants respectfully request that the Office particularly point out how Oda or Brener allegedly teaches or suggests adjusting a frequency of radiation using a voltage applied to a heterodimensional diode to adjust a frequency of a plasma wave in a two-dimensional carrier gas in the heterodimensional diode as in claim 15.

With respect to claims 21 and 28, Applicants respectfully submit that the Office fails to establish a *prima facie* case of obviousness. For example, the Office fails, *inter alia*, to show that Oda or Brener teaches or suggests providing a field effect transistor having a periodic grating gate as in claims 21 and 28. Applicants note that neither Oda nor Brener includes any discussion related to a field effect transistor having a periodic grating gate as in claims 21 and 28. Further, the Office does not address this feature in the Office Action. As a result, Applicants respectfully request withdrawal of the rejections of claims 21 and 28 as allegedly being

unpatentable over Oda in view of Brener. However, should the Office maintain this rejection, Applicants respectfully request that the Office particularly point out how Oda or Brener allegedly teaches or suggests a field effect transistor having a periodic grating gate as in claims 21 and 28.

With further respect to claims 21 and 28, Applicants respectfully submit that the Office fails, *inter alia*, to show that Oda or Brener teaches or suggests adjusting a frequency of radiation using a voltage applied to the field effect transistor as in claims 21 and 28. As discussed above with respect to claim 1, Applicants note that neither Oda nor Brener includes any discussion related to adjusting a frequency of radiation using a voltage applied to the field effect transistor as in claims 21 and 28. As a result, Applicants respectfully request withdrawal of the rejections of claims 21 and 28 as allegedly being unpatentable over Oda in view of Brener. However, should the Office maintain this rejection, Applicants respectfully request that the Office particularly point out how Oda or Brener allegedly teaches or suggests adjusting a frequency of radiation using a voltage applied to the field effect transistor as in claims 21 and 28.

Applicants submit that claim 29 is allowable as presented for the reasons stated herein with respect to claim 14, and for its own unique features. Support for claim 29 can be found, *inter alia*, in paragraph 0027 of the Specification.

Applicants submit that each of the pending claims is patentable for one or more additional unique features. To this extent, Applicants do not acquiesce to the Office's interpretation of the claimed subject matter or the references used in rejecting the claimed subject matter. Additionally, Applicants do not acquiesce to the Office's combinations and modifications of the various references or the motives cited for such combinations and modifications. These features and the appropriateness of the Office's combinations and

modifications have not been separately addressed herein for brevity. However, Applicants reserve the right to present such arguments in a later response should one be necessary and/or in a related patent application, either of which may seek to obtain protection for claims of a potentially broader scope.

In light of the above, Applicants respectfully submit that all claims are in condition for allowance. Should the Examiner require anything further to place the application in better condition for allowance, the Examiner is invited to contact Applicants' undersigned representative at the number listed below.

Respectfully submitted,

/John LaBatt/

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